Work Plan for Total Dissolved Gas (TDG) Total Maximum Daily Loads (TMDLs) In the Mainstem Columbia River and Lower Snake River

Oregon, Washington, and EPA Region 10 In Coordination with Idaho and Columbia Basin Tribes September 2001

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Schedule for Key Activities

The Columbia/Snake TDG TMDL project described in this work plan will be conducted in three phases. The Lower Columbia River will be addressed in the initial phase, the Lower Snake River in the second phase, and the Mid-Columbia River in the third and final phase. TDG TMDLs in the Columbia for Tribal waters including Lake Roosevelt, and in the Snake River from the Clearwater River upstream are not currently included in this draft workplan. The estimated schedule for key activities follows.

Lower Columbia River TDG TMDL

July, 2001

- · Oregon's Draft Lower Columbia TDG TMDL completed
- · Informal Public Review period begins
- · Public Outreach Meeting

August, 2001

- · Washington's Draft Lower Columbia TDG TMDL in preparation
- Meet with Watershed Advisory Groups and Stakeholders
- · Additional Public Outreach

September, 2001

- · Oregon Informal Public Review Period ends
- · Begin revisions to Oregon/Washington Draft Lower Columbia TDG TMDL

October, 2001

- · Draft of Oregon/Washington Lower Columbia TDG TMDL completed
- Public Workshops Informal Public Comment Period begins for Lower Columbia TDG TMDL

November, 2001

- Informal Public Comment Period ends for Lower Columbia TDG TMDL
- · Review Informal Public Comments; Complete Lower Columbia TDG TMDL Final Draft

December, 2001

- Formal Public Comment Period begins for Lower Columbia TDG TMDL
- Public Hearings for Lower Columbia TDG TMDL completed and submitted to EPA jointly by Oregon and Washington

January, 2002

- Formal Public Comment Period ends for Lower Columbia TDG TMDL
- Prepare Responsiveness Summary for Lower Columbia TDG TMDL

February, 2002

· Finalize Lower Columbia TDG TMDL and submit to USEPA for approval

Lower Snake River TDG TMDL

January - April, 2002

· Draft Lower Snake TDG TMDL in preparation

April, 2002

- Draft Lower Snake TDG TMDL completed
- · Informal Public Review period begins
- · Public Outreach Meetings

May, 2002

- Meet with Watershed Advisory Groups and Stakeholders
- Informal Public Review Period ends
- Begin revisions to Draft Lower Snake TDG TMDL

June, 2002

- · Final Draft of Draft Lower Snake TDG TMDL completed
- · Formal Public Comment Period begins

July, 2002

- · Formal Public Comment Period ends
- · Respond to Formal Public Comments and revise Lower Snake TDG TMDL

August, 2002

· Final Lower Snake TDG TMDL completed and submitted to EPA by Washington

Mid-Columbia River TDG TMDL

October 2001 - July, 2002

· Draft Mid-Columbia TDG TMDL in preparation

August, 2002

- Draft Mid-Columbia TDG TMDL completed
- · Informal Public Review period begins
- · Public Outreach Meetings
- · Meet with Watershed Advisory Groups and Stakeholders

September, 2002

- Informal Public Review Period ends
- Final Draft of Draft Mid-Columbia TDG TMDL completed

October, 2002

· Formal Public Comment Period begins

November, 2002

· Formal Public Comment Period ends

November/December, 2002

· Respond to Formal Public Comments and revise Mid-Columbia TDG TMDL

December, 2002

Final Mid-Columbia TDG TMDL completed and submitted to EPA by Washington

<u>Upper Columbia River /Lake Roosevelt TDG TMDL</u>

To be completed by EPA.

Introduction

The States of Oregon and Washington and EPA Region 10 are working in coordination with staff from Idaho and the fourteen Columbia Basin Tribes to develop Total Maximum Daily Loads (TMDL) for Total Dissolved Gas (TDG) on the Columbia and Snake Rivers. Representatives of the partnering States, Tribes, and EPA will constitute the "TMDL team".

A TMDL for a water body is a document that identifies the amount of a pollutant that the water body can receive and still meet Water Quality Standards (WQS). It also allocates responsibility for reductions in the pollutant load that are necessary to achieve WQS. TMDLs achieve water quality standards through the identification and implementation of alternative methods for pollutant reduction. These alternatives may include both structural and non-structural improvements that will be implemented through federal, state, and local laws, and ordinances including local and regional watershed management programs.

A TMDL is required by the federal Clean Water Act for any stream reaches included by States or Tribes on their lists of impaired waters required under Section 303(d) of the Clean Water Act. Impaired waters are those that do not attain State or Tribal Water Quality Standards (WQS). The Snake River from Lower Granite Dam to its confluence with the Columbia has been included on the 303(d) list of impaired waters for TDG by Washington. Oregon and Washington included all of the Columbia River on their 303(d) lists for TDG. The Columbia River also exceeds the WQS of the Colville Confederated Tribes for TDG. The Spokane Tribe of Indians has WQS for the Columbia River that have been adopted by the Tribe but not yet approved by EPA. These standards are also exceeded in the Columbia River.

The States are responsible for developing TMDLs for waters included on their 303(d) lists. EPA has responsibility for developing TMDLs for Tribal waters. EPA also oversees the entire 303(d)/TMDL process with responsibility for approving or disapproving state issued 303(d) lists and TMDLs. If EPA disapproves a State TMDL, EPA is required to develop a TMDL to replace the disapproved one. EPA and the States have agreed to work together to develop the TMDLs for TDG because of the regional significance of the Snake and Columbia Rivers and the complex nature of interjurisdictional TMDLs.

The TMDLs described in this work plan will include that portion of the Snake River beginning at the confluence of the Clearwater River upstream of Lower Granite Dam, and extending to the confluence of the Snake River with the Columbia River. The TMDLs will also include all of the Columbia River from the Canadian border downstream to Astoria. TDG TMDLs in the Columbia for Tribal waters including Lake Roosevelt, and in the Snake River from the Clearwater River upstream are not currently included in this draft workplan.

For the TMDLs described in this work plan, Oregon and Washington will jointly develop the TDG TMDL for the Lower Columbia River (below the confluence of the Snake River). Washington will take the lead for developing and issuing the TDG TMDL for the rest of the two rivers, and work jointly with EPA, who will develop and issue the TDG TMDL for tribal waters including Lake Roosevelt. The parties have agreed to cooperate in the collection of data, making

technical and policy decisions, and providing for public participation.

The TMDL project will be conducted in three separate phases. The Lower Columbia River will be evaluated first, since this is the area jointly administered by Oregon and Washington, and Oregon is operating under the strictest time frames and is already far along. The Lower Snake River and the mid-Columbia River will be handled separately as second and third phases, for several reasons:

- Geographically the Lower Snake and mid-Columbia Rivers are widely separate.
- All of the dams on the Snake River are operated by the Walla Walla District of the U.S. Army Corps of Engineers (USACE).
- The Snake River has unique environmental concerns and operational characteristics.
- The USACE Portland and Walla Walla Districts have conducted extensive research into TDG mitigation at their dams on the Lower Snake and Columbia Rivers, and so the Lower Snake TDG TMDL can probably be developed relatively quickly based on the experience on the Lower Columbia River. However, because the mid-Columbia dams have different operators, additional analysis may be necessary.

The Mid-Columbia TDG TMDL analysis will be started before the Lower Snake TDG TMDL, but will most likely be issued later due to its greater complexity. This workplan does not address the TDG TMDL for tribal waters including Lake Roosevelt, which addressed in the future.

TMDL Elements

The TMDL analysis will include the following elements required by the Clean Water Act, implementing regulations, or State-EPA Memorandum of Agreement for Oregon or Washington:

Federal Requirement	State of Oregon MOA	State of Washington MOA
Scope, or Geographic Extent;	Geographic Extent	Background
	Basin Assessment	
Applicable Water Quality	Total Dissolved Gas	Applicable Criteria
Standards and Numeric Targets;	Water Quality Standard	
Problem Identification;	Deviation of Ambient	Water Quality and Resource
	Conditions from Water	Impairments
	Quality Standards	
Pollutant Source Identification;	Identification of	Technical Analysis
	Sources	
Linkage Between Pollutant	Loading Capacity	Technical Analysis
Loading and Instream Response		Loading Capacity
and Loading Capacity;		
Wasteload and Load Allocation,	Load Allocations	Load & Wasteload Allocations
including alternative strategies;		
Margin of Safety;	Margin of Safety	Margin of Safety
Seasonal variation;	Seasonal Variations	Seasonal Variation
Monitoring	Monitoring	Monitoring Plans
Public Participation	Public Participation	Public Participation

Implementation Plan. | Implementation Plan | Summary Implementation Strategy

Scope, or Geographic Extent

The TMDL analysis will specifically identify the TMDL's geographic scope. For this project, TDG problems will be analyzed in the mainstem Columbia River from the Canadian border to the river's mouth near Astoria, and in the mainstem Snake River from the confluence of the Clearwater River above Lower Granite dam to the river's confluence with the Columbia River. The waters of Oregon and Washington are discussed in this workplan, while Tribal waters including Lake Roosevelt will be addressed in the future. The TMDL report will provide a more detailed analysis of geographic considerations.

Applicable Water Quality Standards and Numeric Targets

For this TMDL, applicable water quality standards for the Columbia and Snake Rivers have been established by Oregon, Washington, and the Colville Confederated Tribes. The Spokane Tribe of Indians have Tribally-approved water quality standards. The numeric target for total dissolved gas that represent achievement of these water quality standards is a total dissolved gas saturation level of 110% which is not exceeded for river discharges up to 7 day, 10-year frequency flood flows. (The Colville Tribe standards do not include a clause regarding the flows for which the TDG criterion applies.) These criteria will be modeled based on historic records and monitored to ensure that standards are not exceeded for future flows.

Special conditions (or "waivers") have been created for voluntary spills from the Columbia and Snake River dams for purposes of fish passage. In Washington these special conditions have been included in the State Water Quality Standards rule, and in Oregon the Environmental Quality Commission has granted variances on an annual basis. Washington's special conditions require maximum TDG levels, measured as the 12-hour maximum average, of 120% in dam tailraces and 115% in dam forebays and below Bonneville dam at Camas/Washougal, and an hourly maximum level of 125%.

Voluntary salmon spills are currently being managed to meet the TDG waiver levels. The goal of the TMDL will be compliance with the 110% TDG criterion, but the special conditions for fish passage may be applied as an interim compliance target. Appropriate alternative measures may be proposed to evaluate compliance with the TMDL, such as maximum spill volumes that allow compliance with the standards under current dam configurations.

Problem Identification

The problem identification process will define the problem and identify the pollutant for which the TMDL will be established. For this TMDL the problem is fairly simple and well understood: spills from the Columbia and Snake River dams produce elevated TDG levels that can cause Gas Bubble Trauma (GBT) in fish. GBT symptoms are observed regularly in the Columbia and Snake

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Rivers under elevated TDG conditions, and historically severe GBT incidents have killed tens of thousands of fish.

The TMDL team will assemble and evaluate all existing and readily available water quality related data and information, develop preliminary loading analysis, and evaluate the sufficiency of the monitoring program. Questions that will be addressed in the problem identification will include:

- What data support the listing of the waterbody as impaired?
- Under what conditions does the problem occur?
- What characteristics of the waterbody, its watershed, and dam operations might be exacerbating or mitigating the problem?
- What efforts to protect the watershed are already underway?

Pollutant Source Identification

Spills from the Columbia and Snake River dams are the sources for elevated total dissolved gas loadings. The following dams and operators are included in these TMDLs:

Lower Columbia River

Bonneville Dam USACE, Portland District The Dalles Dam USACE, Portland District

John Day Dam USACE, Portland District McNary Dam USACE, Walla Walla District

Lower Snake River

Ice Harbor Dam USACE, Walla Walla District
Lower Monumental Dam USACE, Walla Walla District
Little Goose Dam USACE, Walla Walla District
Lower Granite Dam USACE, Walla Walla District

Mid-Columbia River

Priest Rapids Dam Grant Public Utility District (PUD)

Wanapum Dam Grant PUD
Rocky Reach Dam Chelan PUD
Rock Island Dam Chelan PUD
Wells Dam Douglas PUD

Chief Joseph Dam USACE, Seattle District Grand Coulee Dam USACE, Seattle District U.S. Bureau of Reclamation

Existing research into dam design and operation and possible TDG mitigation alternatives will be evaluated. The TMDL team will examine the impacts on the receiving waters and quantify the amount of load that can be assimilated without violating applicable water quality standards. Sources upstream of Grand Coulee include sources entering the United States from Canada and possibly from other tributaries; these will be investigated as part of the future work for Tribal

waters including Lake Roosevelt.

Linkage Between Pollutant Loading and Instream Response and Loading Capacity

The TMDL will evaluate the linkage between the pollutant loading and instream response. This will include analyzing receiving water response to loadings under current levels and determination of loading capacity, while taking into account the complete range of hydrologic and dam operation conditions. Some of the questions which will be considered in the linkage and loading capacity phase will include:

- What is the appropriate level of analysis, taking into account available monitoring data, hydraulic characteristics of the system, temporal and spatial considerations?
- What is the appropriate location for TMDL compliance?
- Is seasonality a factor in the evaluation of impacts on the receiving water?
- What is the appropriate averaging period for evaluation of the load/response relationship?
- How will the spatial extent of the TMDL listing and related cumulative impacts of impairment be incorporated in the TMDL analysis?

Wasteload and Load Allocation, including alternative strategies

The TMDL team will select the pollutant allocation that results in achievement of water quality standards and provides a margin of safety. If multiple alternative allocation strategies are identified that satisfy water quality standards, then other factors will be considered, such as consistency with other environmental requirements, stakeholder preferences, implementation feasibility, and cost.

Margin of Safety

A margin of safety must be identified that will account for uncertainty in the source data and in the model and other analytical procedures, and that will be protective of water quality. The TMDL team leader will determine margin of safety by evaluation of the accuracy of the TMDL estimation techniques and the use of conservative assumptions. The margin of safety may be implicit, if conservative assumptions are adequate, or may be applied through explicit TMDL allocations or numeric targets.

Seasonal Variation

The final pollutant allocations must take into account seasonal variation. This may be accomplished by identifying a critical period or conditions, or by establishing seasonal allocations through a tiered or continuous formula. Seasonal conditions may be addressed on a calendar basis or through physical conditions such as hydrology or temperature.

One key area of seasonal variation to be addressed will be the distinction between voluntary and involuntary spills. Voluntary spills for fish passage, involuntary spills due to high flow, and involuntary spills due to low power demand are all likely to occur during distinct seasonal

periods.

Monitoring

Monitoring will be required as part of the TMDL. The monitoring plan will include adequate spatial distribution and sampling frequency to ensure compliance with water quality standards. The monitoring plan will describe sampling frequency, location, and methods, and include an adequate quality assurance/quality control program.

Public Participation

The final approved TMDL will include documentation of an adequate public participation process. This element is described in more detail below.

Implementation Plan

The States will develop an implementation plan that will identify water quality improvement alternatives and priorities to meet water quality standards. The plan will include a proposed schedule and identify and incorporate stakeholder responsibilities. Typically, the TMDL submittal includes a summary of expected implementation activities, and the states conduct a more detailed implementation planning process separately.

Products

Since the total dissolved gas TMDLs for the Columbia and Snake Rivers are not requiring special studies and are on a short time-line, the only products will be the TMDL submittal reports. The TMDL will address the required elements described above.

Modeling assessment reach by reach will be used to simulate current TDG regimes at each dam, proposed dam TDG mitigation alternatives, and compliance with numeric targets. This effort will include peer review by the impacted parties as well as other state and federal entities. Total dissolved gas models developed by USACE will be used for this TMDL.

Loading capacity and allocations need to be developed for each reach. Since the US Army Corps of Engineers owns and operates the nine of the sixteen dams in the study area and have been a leader in research throughout the study area, allocation will be done in consultation with the Corps. As dam operators, the three PUDs and the Bureau of Reclamation will be consulted for the Mid-Columbia TDG TMDL. National Marine Fisheries will also be consulted on allocations, since many of the violations are related to meeting passage demands for endangered salmon, and consultation by EPA is required under the Endangered Species Act.

Public Participation and Outreach

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The TMDL team will develop and implement the Public Participation and Outreach strategy for this TMDL project.

Individual outreach meetings with be held with the appropriate watershed advisory groups and with primary stakeholders, which include:

US Army Corps of Engineers, Portland, Walla Walla, and Seattle Districts Grant, Chelan, and Douglas PUDs U.S. Bureau of Reclamation Bonneville Power Administration National Marine Fisheries Service

In addition meetings and presentations will be held with the National Marine Fisheries Service Water Quality Team that includes federal and state agencies, public utility agencies, Tribes, and Bonneville Power.

The TMDL team will hold public meetings to receive input and comments for all stakeholders. These meetings will include public workshops to accept informal comments for each regional phase of the TMDL project, and public hearings for the Formal Public Comment Period.

The TMDL team will also use other public outreach tools, such as: letter, focus sheets, and other printed materials; websites with short narratives and graphics, downloadable documents, and relevant links; press releases and public service announcements; and special news articles with field visits and interviews. Use of these tools will be timed as appropriate to key events such as meetings and report publication dates.

Tribal Coordination and Consultation

(To be completed by EPA.)